

have hitherto been at its disposal. The question arises, therefore, whether help from some public source may not reasonably be expected. There is doubtless a very general popular feeling that ordinary scientific research is as much a recreative amusement to its devotees as are games and sport to the majority, and that those who indulge their whims should bear the additional cost like any other section of the community. But it must not be forgotten that there are various degrees of games and sports suited to the several means of those who pursue them, whereas ability and inclination to make and record scientific discoveries are in no way proportional to the resources of those who possess them. It must also be emphatically maintained that there is no basis for such a comparison. Science is undoubtedly an absorbing source of gratification to those who study its problems; but even the most abstract research, however far removed from the affairs of everyday life, is an asset of which no man can estimate the value.

In some directions the public has already become accustomed to the scientific spirit. It has begun, for example, to understand the value of preventive medicine. It no longer reserves its gratitude for those who discover remedies for disease; it realises the still greater importance of the work of those who try to learn the origin of disease and the influence of the environment upon the exciting cause. It should now be led to understand its debt to those who make advances in this and other branches of purely scientific work. The germs of all material progress and comfort are contained in our scientific serials and the publications of our scientific societies, and to allow a limitation of their scope is a hindrance to the public welfare.

The Government has already aided a few of the older and more important societies with a partial or complete grant of premises, and it entrusts an annual sum of money, given in the Estimates of 1920-21 as 11,000*l.*, to the Royal Society, to be distributed for scientific investigations by a committee appointed for that purpose, as well as 1000*l.* annually towards the cost of scientific publications. It has also established the important Department of Scientific and Industrial Research. We would now urge that a further step should be taken, and some direct endowment provided for those purely scientific publications which have for so many years been maintained by voluntary effort, both to the honour of the country and to the welfare of mankind.

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Useful Physiology.

Physiology and National Needs. Edited by Prof. W. D. Halliburton. Pp. vii+162. (London: Constable and Co., Ltd., 1919.) Price 8s. 6d. net.

PROF. HALLIBURTON and his fellow-lecturers have made out a good case for physiology having done its bit in the great war. The editor leads off with an account of the activities of the Royal Society and other committees in food control in general, and gives more particular details of the inquiries made in his own laboratory on the value of margarines and fatty acids. Vitamines occupy the whole of Prof. Hopkins's discourse, and Prof. Harden returns to them again with a summary of the work done on scurvy at the Lister Institute. But Prof. Harden is surely in error in saying that Lind held that scurvy was caused by abstinence from fresh vegetable food. That astute observer knew 150 years ago that scurvy could be cured by fresh vegetables, but he thought it was caused by living in confined, damp quarters, arguing that no one would say that ague was caused by abstinence from bark because it could be cured by giving bark.

Prof. Paton's essay on physiology in the study of disease is much less satisfactory. He is under a complete misapprehension of the aim and objects of medicine—a mistake shared in part by Prof. Halliburton—and medical men who read his solemn castigation of their empirical methods may not unreasonably retort that his discovery that tetany is due to the liberation of guanidin, controlled "somehow" by the parathyroids, has left medicine just about where it was. Prof. Paton seems to think that the object and business of medicine is to study disease. The object of medicine in reality is to prevent people feeling ill, and to make those who do feel ill feel better, and its success is to be measured by the product of the degree of betterment and its duration. "What the physician has to find out in every case," he says, "is simply what has gone wrong, and why it has gone wrong, before he attempts to put it right." So that if I have a headache and send for my physician, he is to engage with the hitherto insoluble problem of the nature and cause of the common megrinous headache (which is one of the great causes of human inefficiency, and no trivial matter) and solve it before he cures me by exhibiting 10 grains of aspirin: it might be good physiology, but it would be thoroughly bad medicine. The "practical man" is of course very wicked from our point of view, but he has been belaboured pretty freely these last few years; and, after all, he does a lot of practical good in

his blundering way. *Gerris*, as Mr. Belloc says, would sink if he stopped to meditate about the surface film, and he might get no nearer the truth than Prof. Paton does when he affirms that phosphene yields chlorine in the lungs. Knowledge helps practice truly enough, but to ask that practice shall stand still while a particular sort of intolerant knowledge gropes to a rationale will meet no national need whatever.

Prof. Dendy's interesting account of the ravages of weevils in stored grain and the means of preventing them tells, on the other hand, an excellent tale of practical empiricism. Prof. Dendy found, as on general grounds he expected to find, that the weevils soon perished if infested grain was shut up in air-tight receptacles in which the metabolism of the seeds soon replaced most of the oxygen by carbon dioxide, and he shows with a variety of experiments that air-tight storage is the practical method which is wanted: which appears to have been known from time immemorial and is expressed in the habit of Indians, Maltese, and others in storing their harvested grain closely in covered underground pits in face of the opinion that it was "absurd to hold that weevils require a free play of air or that free access of air is favourable to their existence," given by the entomological expert—doubtless a mere morphologist.

Natural man, indeed, as Dr. Pembrey argues in his breezy plea for the wild life, is apt to go right: "A sturdy growth of children is not to be obtained by the intelligent selection of the quality or quantity of their diet, but by the natural process of muscular activity in the open air, the appetite with its likes and dislikes acting as the guide in questions of food" (p. 158), which is not quite what the editor seems to say (p. 23). But the discrepancy is only on the surface: Sussex is not the Marylebone Road, and it is when civilisation interferes that trouble comes. Western refinements in rice polishing gave the East beriberi; a world trade in wheat gave the weevils their chance; mean and restricted lives brought in physical exercises instead of games. The truly physiological procedure, says Dr. Pembrey, is to put people where they can live a natural life by accumulated experience and to let them live it. "Bread and cheese" off the hedges is an older remedy than orange juice, and even scientific opinion has been taught by Prof. Leonard Hill that there is something to be said for our primitive open fires.

The book as a whole is extraordinarily interesting from many different aspects, as much perhaps for the questions it asks as for those it answers.

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"Physiology" is conceived in no narrow spirit; it is hygiene, pathology, bacteriology, and pharmacology, as well as itself. And in this generous field everyone will find a good many things worth thinking about.

A. E. B.

Service Chemistry.

Service Chemistry: Being a Short Manual of Chemistry and Metallurgy and their Application in the Naval and Military Services. By the late Prof. Vivian B. Lewes and Prof. J. S. S. Brame. Fifth edition. Pp. xvi+576+vii plates. (London: Edward Arnold, 1920.) Price 21s. net.

THE late Prof. Vivian Lewes, of the Royal Naval College, Greenwich, an excellent teacher and an admirable lecturer, conferred a great benefit on the Service of which he was a member by the compilation of this manual. In the early days of the history of the college, the relation and importance of physical science to the business of the naval officer were but dimly appreciated by the authorities at Whitehall, and the scheme of instruction at Greenwich went but little beyond the standard of a public school which sought to develop its modern side. Prof. Debus, the first professor of chemistry, although a sound and remarkably well-informed chemist, carried with him to the college merely the traditions and methods of Clifton. The scope of his instruction of the naval lieutenant was practically that which had served him for years past in the several public schools to which he had been attached. He continued to teach chemistry simply as a branch of a liberal education, with no very direct reference to the life-work of those whom he addressed. It may be that at the outset of the career of the college no other course was open to him. The preliminary education of a naval officer at that period afforded no opportunity for him to acquire even the most elementary knowledge of science, and hence his teacher had of necessity to restrict himself to the kind of instruction which a well-ordered school system ought to have supplied.

Prof. Debus exercised a very salutary influence at the Royal Naval College. He was personally popular, and, in spite of certain little mannerisms, his quiet dignity and personal bearing enabled him to keep an effective control over a class of young men whose sense of humour is proverbially always acute and occasionally irrepressible. But to the budding Nelson, keen on his job, there must have been much in the professor's teaching that made no appeal. It probably seemed to him to have no possible relevance to the work of his pro-